

Stationary, digital ratio pyrometer for non-contact temperature measurement in ranges between 600 and 3000 °C

ISR 6 Advanced



- Widest temperature ranges for most flexible process adaptation
- Highest accuracy and repeatability in its class
- “Dirty Window” Warning
- Fully digital core for sub-ranging and adopted analog output
- Very fast 2 ms response time for highly dynamic processes
- Best optics in its class with manual focus capability
- 4 digit LED display
- Robust, stainless steel sensor for harsh environments (IP65/NEMA4)



The ISR 6 Advanced pyrometer is a digital, compact and fast 2-color pyrometer for non-contact temperature measurement. The pyrometer measures in the 2-color method (ratio method) in which two adjacent wavelengths are used for the temperature determination.

This technique offers the following advantages compared to standard 1-color pyrometers:

The temperature measurement is largely independent of the object's emissivity and in wide ranges unaffected by dust and other contaminants in the field of view. The measuring object can be smaller than the spot size, measurements through dirty viewing windows are possible up to a certain contamination.

Additionally the pyrometer can be switched to 1-color mode and used like a conventional pyrometer in a spectral range near 0.9 µm.

The response time of only 2 ms facilitates the measurement of fast processes. The ISR 6 is equipped with a built-in “dirty window” warning.

The pyrometer can be connected to a PC through an RS485 to USB connection, enabling parameter adjustments to be made using the InfraWin software. This can be used for temperature indication, data logging and further analyzing of complete temperature processes.

Typical applications:

- Steel Making
- Metal Processing - Induction Processes: Hardening, Welding, Forging, Brazing, Soldering, etc.
- Metal Processing - Noble Metals Melting and Purifying
- Metal Processing - Wire/Rod Mill Water Box Measurement, Laying Head & Air Cooling Conv.
- Solar Industry - Silicon Processing Polycrystalline Casting in Vacuum Melting Furnace, Silicon Ingot Growth in CVD Reactors (Siemens Process), Crystal Pulling of Monocrystalline Silicon (Czochralski Process)
- Glass Industry - Gob Temperature Measurement
- Cement Industry - Clinker temperature in rotary kilns

Technical Data

Measurement Specifications

Temperature Ranges:	600 to 1400°C (MB 14) 700 to 1800°C (MB 18) 800 to 2500°C (MB 25) 1000 to 3000°C (MB 30)
Sub Range:	Any range adjustable within the temperature range, minimum span 50°C
Spectral Ranges:	Channel 1: 0.9 µm; Channel 2: 1.05 µm
Resolution:	0.1°C or 0.2°F at interface; < 0.0015% of selected sub range at analog output, min. 0.1°C, 16 bit; 1°C or 1°F on display
Emissivity ϵ :	0.050 to 1.000 in steps of 1/1000 (1-color mode)
Transmittance τ :	0.050 to 1.000 in steps of 1/1000 (1-color mode)
Emissivity Slope K:	0.800 to 1.200 in steps of 1/1000 (2-color mode)
Measurement Uncertainty:	< 1500°C: 0.3% of reading in °C + 2°C > 1500°C: 0.6% of reading in °C
(K = 1, $t_{90} = 1$ s, $T_{amb.} = 25^\circ\text{C}$)	
Repeatability:	0.15% of reading in °C + 1°C
(K = 1, $t_{90} = 1$ s, $T_{amb.} = 25^\circ\text{C}$)	

Optical Specifications

Sighting:	Built-in laser aiming light (max. power level < 1 mW, $\lambda = 630$ to 680 nm, CDRH class II) or through-lens sighting
Optics:	Manually focusable from rear cover measuring distance $a = 210$ to 5000 mm
Distance Ratio:	MB 14 approx. 100 : 1 MB 18 approx. 190 : 1 MB 25 and MB 30 approx. 350 : 1

Environmental Specifications

Protection Class:	IP 65 IEC 60529 (value in mated condition)
Operating Position:	any
Ambient Temperature:	0 to 65°C at housing
Storage Temperature	-20 to +80°C
Relative Humidity:	Non condensating conditions
Weight:	0.6 kg
Housing:	Stainless steel
CE Label:	According to EU directives about electromagnetic immunity

Interface

Connection:	12-pin connector
Display (in rear cover):	LED, 4 digit matrix, 5 mm high for 2-color or 1-color temperature signal or measuring distance
Parameters	Adjustable via interface: 2-color / 1-color temperature signal, accordingly emissivity slope or emissivity, temperature sub range, settings for maximum value storage, address, baud rate, switch off limit, "dirty window" warning, transmittance, response time t_{90} , 0 to 20 mA or 4 to 20 mA analog output range, °C/°F
	Readable via interface: measured value, internal temperature of the unit, measuring distance

Communication

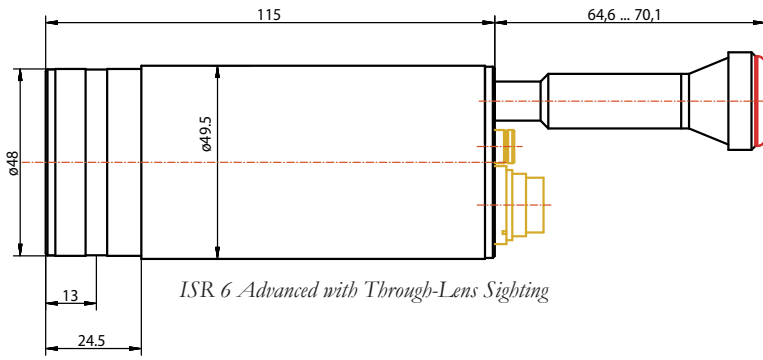
Analog Output:	Adjustable 0 to 20 mA or 4 to 20 mA, linear (via digital interface)
Digital Interface:	RS485 addressable (half-duplex) Baud rate: 1200 to 115.2 kBd (on request RS232, not addressable)
Switch Off Limit:	2% to 50% (adjustable via interface)
"Dirty Window" Warning:	Relay contact, max. continuous current 0.4 A, setting of the warning level: 0 (off) to 99%
Response Time t_{90} :	2 ms (with dynamic adaption at low signal levels); adjustable to 0.01 s; 0.05 s; 0.25 s; 1 s; 3 s; 10 s
Maximum Value Storage:	Built-in single or double storage. Clearing with adjusted time t_{clear} (off; 0.01 s; 0.05 s; 0.25 s; 1 s; 5 s; 25 s), via interface, automatically with the next measuring object, external contact, hold-function

Electrical

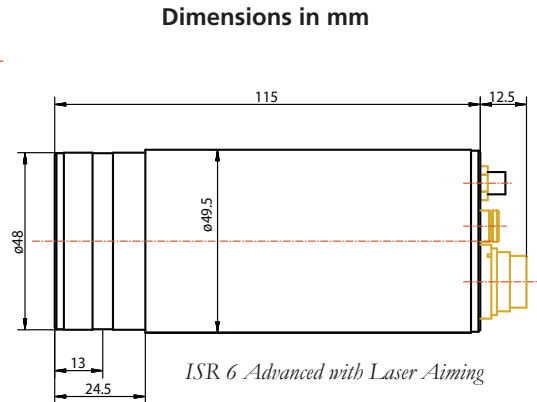
Power Supply:	24 V DC \pm 25%, ripple must be less than 50 mV
Power Consumption:	Max. 3 W (incl. laser)
Load (analog output):	0 to 500 Ω
Isolation:	Power supply, analog output and digital interface are electrically isolated from each other

Note: MB is a shortcut used for temperature range (in German: Messbereich)

Product Schematic



ISR 6 Advanced with Through-Lens Sighting



Dimensions in mm

ISR 6 Advanced with Laser Aiming

Sighting



ISR 6 Advanced with Through-Lens Sighting



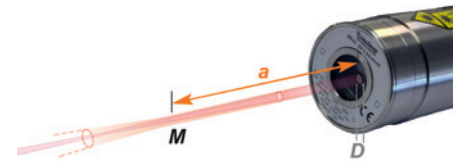
ISR 6 Advanced with Laser Aiming



Optics

The optics can be manually adjusted at all distances between 210 mm and 5000 mm.

The table below shows examples of distances and the corresponding spot diameters:



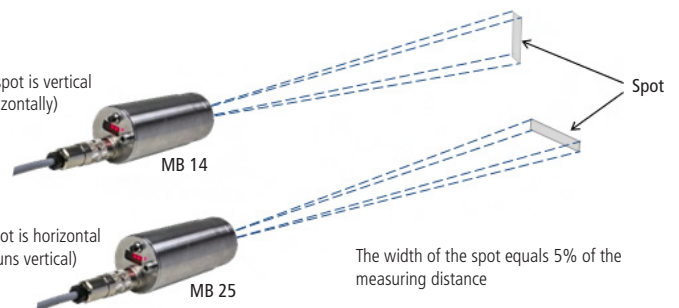
ISR 6 Advanced				
	600 to 1400 °C	700 to 1800 °C	800 to 2500 °C	1000 to 3000 °C
distance a [mm]	Spot diameter M [mm]			
210	2.1	1.1	0.6	0.6
300	3	1.6	0.9	0.9
500	5	2.7	1.5	1.5
800	8	4.2	2.3	2.3
1300	13	6.9	3.7	3.7
2000	20	10.6	5.8	5.8
5000	50	27	15	15

Effective aperture D for all temperature ranges:
13 mm (focused to longest distance) to 15 mm (focused to shortest distance)

Optional Integrated Line Optics

Besides the standard optical heads, the ISR 6 Advanced is also available with integrated line optics, which features a special spot in the shape of a line. This provides additional advantages for some applications such as wire production or pouring stream measurements.

The orientation of the line spot is vertical for MB 14 (wire moves horizontally)



The orientation of the line spot is horizontal for MB 25 (pouring stream runs vertical)

The width of the spot equals 5% of the measuring distance

Reference Numbers

Type	Temperature Range	With Through-Lens Sighting	With Laser Aiming	With Laser Targeting and Line-Shaped Spot (5%)
ISR 6 Advanced	600 to 1400°C (MB 14)	3 904 020	3 904 010	3 904 050
	700 to 1800°C (MB 18)	3 904 080	3 904 070	-
	800 to 2500°C (MB 25)	3 904 150	3 904 140	3 904 180
	1000 to 3000°C (MB 30)	3 904 220	3 904 210	-



Scope of delivery: Pyrometer with PC software InfraWin for adjustment and evaluation, Works Certificate, and Manual
Ordering note: A connection cable is not included in scope of delivery and must be ordered separately

Accessories

- | | |
|---------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------|
| 3 820 330 Connection cable, 5 m, straight connector* | 3 826 510 PI 6000: PID programmable controller |
| 3 820 500 Connection cable, 10 m, straight connector* | 3 890 640 DA 4000-N: LED digital display to be built into the switchboard |
| 3 820 510 Connection cable, 15 m, straight connector* | 3 890 650 DA 4000: like the DA 4000-N, but additionally with 2 limit switches |
| 3 820 810 Connection cable, 20 m, straight connector* | 3 890 570 DA 6000-N digital display, to allow adjustment of Pyrometer through RS485 interface |
| 3 820 820 Connection cable, 25 m, straight connector* | 3 890 530 DA 6000: like the DA 6000-N, but with analog input and 2 limit switches for the RS485 interface. |
| 3 820 520 Connection cable, 30 m, straight connector* | 3 890 630 LD24-UTP; large digital indicator, 57 mm height of digits |
| 3 820 340 Connection cable, 5 m, 90° connector* | 3 843 250 ROT 5 scanning mirror attachment up to 70° |
| 3 820 530 Connection cable, 10 m, 90° connector* | 3 843 490 External Scanner Series 5 & 6 with fused silica window; 24V AC/DC |
| 3 820 540 Connection cable, 15 m, 90° connector* | 3 834 210 Adjustable mounting support |
| 3 820 830 Connection cable, 20 m, 90° connector* | 3 846 260 Mounting support |
| 3 820 840 Connection cable, 25 m, 90° connector* | 3 846 290 Mounting support with fused silica window |
| 3 820 550 Connection cable, 30 m, 90° connector* | 3 835 160 Air purge unit, aluminium |
| 3 852 290 Power supply NG DC for DIN rail mounting; 100 to 240 V AC ⇒ 24 V DC, 1 A | 3 835 590 90° mirror for Series 5, quartz glass window |
| 3 852 550 Power supply NG 2D for DIN rail mounting; 85 to 265 V AC ⇒ 24 V DC, 600 mA with 2 settable limit switches | 3 837 230 Water cooling jacket (heavy duty) with integrated air purge unit |
| 3 826 720 USB to RS485 adapter cable, 1.8 m long | 3 846 590 Vacuum flange KF16 with quartz glass window |

*All connection cables include a short adapter cable with a 9-pin SUB-D connector. This connector may be used in combination with the RS485 to USB adapter.

Accessory Overview

Electrical Accessories



Industrial Power Supplies



Digital Display



Fast Digital Controllers

Mechanical Accessories



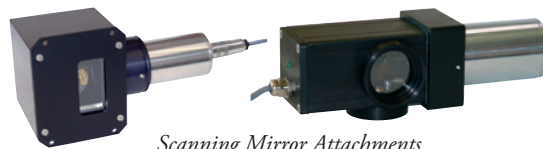
Mounting Brackets



Air Purges



Air/Water Cooled enclosures



Scanning Mirror Attachments

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 ISR6 Advanced_Datasheet-EN - Rev. 02/08/2016